Biofuels news

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Focus On...

Fuel for Thought: Our Bodies, Our Cars

Summer vacation 1998. As soon as final exams are over, two college students drive across several states to spend the summer with Mom and Dad. About 150 miles from home, they realize the fuel tank is nearly empty, and they have just enough money to buy gasoline to fill it. They're also hungry and thirsty.

Warren Gretz, NREL/PIX 06362

We all have to make choices about how to spend our resources. And most of us have had—at least once—the difficult experience of having too few resources to meet our needs. Sometimes we need to evaluate our resources (Do we have enough after all?), or we need to analyze our needs (Are they real or perceived, or do we need to revisit the level of need?). The students might have determined that they could make it home on, say, half a tank of gas, and still have enough money to buy sandwiches and drinks. Or they might have decided to fill the tank and arrive home extra-hungry. On a more global level, there is some healthy debate about whether the United States should use its vast croplands strictly for growing food, or whether some of that resource should be used to grow crops for fuel.There are good arguments on both sides, and farmers will take the choices seriously; after all, their livelihoods depend on choosing correctly. As we present the options, we need to carefully consider the nation's needs and resources.

Why use crops for energy?

U.S. farmers have always planted energy crops of sorts. Until the 1920s, about 90 million acres were devoted to planting hay to feed horses and other draft animals. These animals in turn provided energy to pull plows, wagons, and other types of transport. Even after our society became more dependent on internal combustion and diesel engines, crops were used to make fuel for transportation (during the 1920s and 1930s about *continued on page 2*

PRO "Our leadership should be driven both by its very real concerns for the global environment, and by the potential jobs and earnings which could and should be generated by America's comparative advantages in farm production, processing, and delivery."

Dennis Avery, director,
Global Food Issues at the Hudson Institute

CON "Over time, an expanding agricultural fuel market will mean that more and more farmers will have a choice of producing food for people or fuel for automobiles… [and] they [farmers] are likely to produce whichever is more profitable."

Lester Brown, president,
Worldwatch Institute

1,200 fueling stations in the Midwest sold gasoline with 6%–12% ethanol blends). In fact, Henry Ford advocated using agricultural and other wastes to make ethanol fuel, and in 1900 Rudolf Diesel demonstrated his prototype engine on peanut oil.

From the 1940s to the present, petroleum-based fuels have become deeply ensconced in the U.S. economy and culture. They are relatively inexpensive, reliable, and easy to obtain. But certain disturbing facts remain: the United States imports more than 50% of its oil for transportation, which makes for extreme strategic and economic vulnerability; and fossil fuels are finite—they need millions of years to form, and known resources have been seriously depleted during this century. Crops, on the other hand, are sustainable. They can be planted year after year, and can always provide feedstock for fuels.

Farmer and scientist examine switchgrass, a dedicated energy crop for ethanol production.

Warren Gretz, NREL/PIX 00305

Should cropland be used to grow crops for food and fuel?

Few people would argue that the primary function of agriculture is to grow food crops. But farmers now grow less of some crops than they once did; in some cases they need less land to grow the same crops; and they have more options than ever about which crops to grow. The reasons for these changes include:

- The 1996 changes in farm policy (see "How Has It FAIRed," p. 5) eliminated Acreage Reduction Programs and gave farmers the freedom to plant various types of crops.
- The United States is exporting much less grain than it once did. Some countries, which in the past relied heavily on U.S. crops to feed their populations, can now grow enough to export. Argentina, for example, now exports 10.5 million tonnes of corn annually; China exports 4 million tonnes.
- Improved agricultural technologies, including bioengineered pest control, help farmers attain higher per-acre yields.
- According to the USDA's recently published Agricultural Baseline Projections to 2007, land use for traditional major field crop requirements will rise from 261 million acres in 1997 to more than 270 million acres in 2007, mostly because of increases in corn and wheat. The report credits this increase to crop producers' responses to higher prices and market returns.

Another important factor is that, no matter which crops are grown and harvested, there is waste associated with them. Researchers at universities and laboratories are working to improve the technologies to turn these wastes into fuels. Additionally, some cropland is quite marginal. So instead of using it to grow nutrient-intensive crops such as corn and wheat, farmers can plant crops such as soybeans, which *continued on page 3*

help replace nutrients in the soil and can be used to for both food and fuel. Or the land could be used for dedicated energy crops such as poplar trees and switchgrass.

What's the advantage of dedicated energy crops?

Properly managed, energy crops can reduce erosion and chemical runoff, sequester carbon in the soil, and provide habitat for wildlife. Almost any kind of plant can be used to produce fuel. The big question is whether that can be done economically and in an environmentally safe manner. According to the 1992 Agricultural Census, an estimated 291 million acres of cropland in the United States (including acres idled for economic and environmental reasons) are suitable for energy crop production.

There is no absolute solution

Because the United States has an abundance and variety of natural resources, any effort to use one solution to resolve all its energy and environmental issues would be most unrealistic. However, the overwhelming evidence indicates that U.S. farmers could use a great deal of land for energy crops, without using land that supports natural ecosystems and endangered wildlife. It comes back to asking questions about choices: Which resources are available? What are our real needs? What kinds of technologies can we use? Which solution best meets our needs given environmental and economic realities? If we can answer these questions, we will be well on our way to making responsible decisions about using our valuable resources.

What is POLYSYS?

POLYSYS is a modeling framework developed jointly by the University of Tennessee's Agricultural Policy Analysis Center, the USDA's Economic Research Service, and Oklahoma State University's Great Plains Agricultural Policy Center. It provides a tool for estimating policy, economic, and environmental impacts associated with the agricultural industry.

POLYSYS generally simulates a 5- to 10-year projection period; however, 25-year projections have been estimated and longer intervals may be supported. It can estimate agricultural production response, resource use, and environmental indicators in 305 geographic regions with relatively homogeneous production characteristics. Users can trace price and output paths associated with a specific change scenario, and determine the direct and indirect effects on other agricultural and nonagricultural activities.

In the Spotlight

What about the New Uses Council?

The New Uses Council (NUC) is dedicated to the development and commercialization of new uses of renewable agricultural products made from traditional commodities and new crops.

"New uses" are promoted as environmentally friendly alternatives to current non-sustainable practices. New uses already reduce the importation and use of petroleum in applications where non-polluting alternatives such as bioplastics, bioenergy, ethanol, and biodiesel are readily available. Other new uses, such as kenaf paper and soymeal or rice, and wheat-straw composite building materials, already reduce the waste of our forest resources.

NUC Goals are:

- By the year 2000, quadruple industrial and other nonfood demand for renewable agricultural resources
- Generate public demand for renewable-resource-based industrial and nonfood consumer products
- Increase public and private investment in commercialization research, and in the development of renewable resource-based industrial and nonfood consumer products
- Make renewable-resource development a national priority
- Capitalize on the tremendous potential of new uses to increase manufacturing jobs and business development.

For information about the NUC, to read the NUC newsletter, *Evergreen*, or to order NUC publications including the Bioproducts Directory, visit the NUC Web page at ag.arizona.edu/OALS/NUC/NUCHome.html, or contact the NUC Chairman, Bob Harris, at the Nebraska Energy Office: bharris@mail.state.ne.us.

House 297-86
Senate 88-5

VICTORY...ISTEA passes as TEA-21!

On May 22, Congress passed the ethanol tax incentive through 2007. The 6-year federal highway reauthorization bill passed both the House and Senate with overwhelming majorities. On June 9, President Clinton signed the landmark transportation legislation into law.

This $217 billion highway bill, previously known as the Intermodal Surface Transportation Efficiency Act, is now called the Transportation Equity Act of the 21st Century (TEA-21). The ethanol tax incentive will remain at the current $0.54/gal of ethanol through the year 2000; however, it will gradually be reduced to $0.53 in 2001, $0.52 in 2003 and $0.51 in 2005. Governor Frank O'Bannon (D-IN), said: "We applaud House and Senate conferees and the congressional leadership for acting in a bipartisan manner to ensure that domestically produced, renewable fuels continue to play a role in our nation's energy mix." And Ryland Utlaut, president of the National Corn Growers Association, said, "This landmark legislation marks a major victory for all Americans who will reap the benefits of cleaner air, new jobs, increased farm income, rural economic development, lower fuel costs, and reduced U.S. dependence on foreign oil."

"I am pleased that the Act extends the ethanol tax incentives through 2007. These are commonsense investments that will help protect air quality, reduce greenhouse gas emissions, and create new economic opportunity for farmers." *- President Clinton*

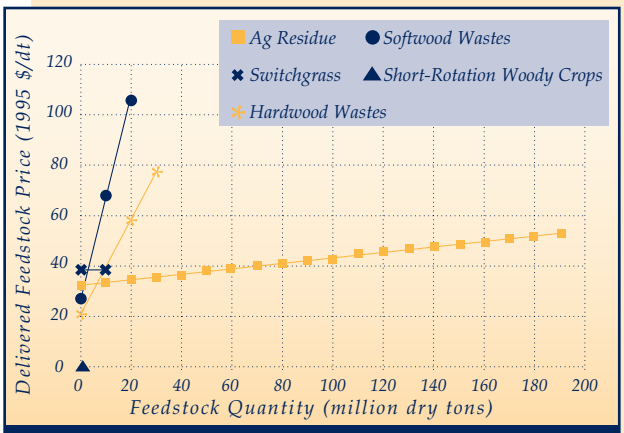
For more information on TEA-21, visit the web site at www.fhwa.dot.gov/tea21/index.htm.

Renewable Energy and Ethanol Promoted on Capitol Hill

Representative Dan Schaefer (R-CO), founder of the House Renewable Energy Caucus, was one of several speakers at the third annual Renewable Energy Expo held May 21, 1998 on Capitol Hill in Washington, DC. He stated: "Every year, more applications for renewable energy and energy efficiency technologies are being discovered and commercialized. And with continued research, development, and demonstration, these new technologies will prove to be as common and reliable to our children and grandchildren as today's conventional energy sources are for us." The Expo drew nearly 3,000 attendees and was an energetic gathering of government, industry, and the public. The exhibitors displayed the latest renewable energy and energy efficiency technologies. Other speakers were former DOE Secretary Federico Peña, Assistant Secretary of Energy Dan Reicher, Senator Wayne Allard (R-CO), and Representative David Minge (D-MN). For a list of House Renewable Energy Caucus members, visit the web site at www.biomass.org/memlist.htm.

OFD Resource Assessment Efforts

DOE's Office of Fuels Development (OFD) is conducting biomass resource assessments at the national, regional, state, and county levels to support planning efforts for biofuels research and development, and to understand and identify opportunities for deploying biofuels technologies. They range from inventories to model-based cost-and-supply analyses.



Biomass Feedstock Supply Curves: Year 2000

Waste materials such as agricultural and forestry residues, pulp mill wastes, and energy crops are assessed. Although these assessments are not generally conducted for a specific facility, several facility-specific cost-shared feasibility studies have been performed.

OFD's Regional Biomass Energy Program works with state agencies and others to conduct general biomass resource inventories for Wyoming, Oklahoma, Nebraska, Colorado, Kansas, California, Florida, and others. Additional assessments include forest residues in Idaho, urban wood residues in Colorado and Michigan, and a regional 13-state study of mill residues in the Southeast. At a more local level, some assessments included *continued on page 4*

feasibility of corn residue collection in Kearney, Nebraska, and methodology and potential feedstocks for the Philadelphia area.

On the national level, OFD has developed supply curves for major biomass feedstocks—agricultural residues (corn stover and wheat straw), forest hardwood and softwood residues, corn, and energy crops (hybrid poplars, switchgrass, willows)—for the years 2000, 2005, 2010, and 2015, and extrapolated these curves to the years 2020 and 2025. Estimated agricultural residue prices include the cost of collecting the residues and a premium paid to farmers to compensate for nutrient losses, etc. Available quantities are adjusted for the quantities that must remain in the field to maintain soil carbon levels and limit erosion potential. Softwood and hardwood forest residue supply curves are estimated by updating a model originally developed by Alan McQuillan at the University of Montana, and include sound deadwood, live cull wood, and logging residues. Estimated prices include costs to collect, process, and transport the feedstocks, and a return for risk. Dedicated energy crop supply curves are based on the principle that farmers need to earn at least the same profit from energy crop production as from other crops. A distribution of agricultural cash rental rates is used as a measure of the profitability of the land when used to produce conventional agricultural crops. Energy crop yields are based on field trial results and expert opinion. Energy crop production costs are estimated using Oak Ridge National Laboratory's BIOCOST model, which estimates production costs for seven major crop regions using methodology consistent with that used by USDA to estimate the cost of producing conventional crops.

On the Federal Front

How Has It "FAIRed"?

The 1996 Farm Act (the Federal Agriculture Improvement and Reform Act of 1996—FAIR) has fundamentally changed U.S. agricultural programs. It eliminated supply management, increased flexibility, and changed financial support for contract crops such as wheat, corn, sorghum, barley, oats, rice, and upland cotton.

FAIR transferred income variability risk from the government to the farmers. Farmers must now manage this risk by monitoring market forces and considering alternative crop production. Annual Acreage Reduction Programs were eliminated to increase farmers' flexibility to respond to market prices and make cropping decisions. This facilitated the gain in total plantings and the shifts among crops seen during 1996 and 1997. One way farmers can buffer this "risk" factor is to continue to use crop insurance. They can also diversify production, contract in advance for future sales, integrate ownership, and involve more value-added processing beyond the farm gate.

The *USDA Agricultural Baseline Projections to 2007* report focuses on the larger market orientation in the domestic agricultural sector under FAIR, and how it puts U.S. farmers in a favorable position for competing in the global marketplace. Producers now respond to signs from the marketplace rather than to government commodity programs. This makes agricultural production economically more efficient. The agricultural sector increasingly relies on the marketplace for its income as direct government payments decrease (after the year 2000 they will represent less than 3% of gross cash income to farmers).

Renewable Resources 2020, a coalition initiated by the National Corn Growers Association, was developed by the U.S. agricultural, forestry, and chemical communities to advance a vision for creating plant-based, renewable products to replace current petroleum-based products. Energy crops could provide the market expansion needed to stabilize financial security for farmers. Government crop requirements have been lifted, so planting designated energy crops could provide security to farmers and to the nation. Also, food, seed, and industrial uses are predicted to increase, mainly because corn sweetener and ethanol are being used more and more. The increase in ethanol use may create a price signal that will stimulate further ethanol production, which could *continued on page 6*

in turn increase the market forces so farmers will invest in crops and more value-added processing for ethanol production. For more information about Renewable Resources 2020, visit the web site at www.ncga.com.

FAIR has enabled farmers to expand their crop bases and production possibilities—opportunities that that have not yet been realized. But two factors may motivate farmers to produce energy crops: (1) automobile manufacturers continue to increase their production of E85 vehicles; and (2) the draft E85 Action Plan (developed by DOE's Office of Technology Utilization) identifies high-priority areas for E85 infrastructure development. This economic niche is ripe for the farmers to harvest.

For more information on USDA baseline projections, visit the web site at www.econ.ag.gov/Briefing/baseline or call Paul Westcott at 202.694.5335.

Upcoming Conferences and Events

September 13–17, 1998
17th Congress of the World Energy Council and Exhibition
(Including Renewable Energy Pavilion)
Houston, Texas
Contact: Susan Nelson, U.S. Energy Association, 202.331.0415
Web site: www.wec98congress.org

October 4–8, 1998
BioEnergy 98: International Biomass Energy Conference
Madison, Wisconsin
Contact: Fred Kuzel 312.407.0177
Web site: www.cglg.org/projects/biomass/bioenergy98.html

September 20–25, 1998
World Renewable Energy Congress–V
(Renewable Energy, Energy Efficiency, Policy and the Environment)
Florence Italy
Contact: Professor Ali Sayigh, +44-1189611364, or e-mail: asayigh@netcomuk.co.uk
Web site: www.wrenuk.co.uk/floren/floren.html

October 14–16, 1998
1998 International Renewable Energy Conference and Exhibition
Tokyo, Japan
E-mail: renewcon@mb.infoweb.ne.jp

DOE/GO-10098-581 For more information, contact the National Alternative Fuels Hotline at 800-423-1DOE.
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